

Letter to the Editor

Why is COVID-19 virus so deadly for cancer patients?

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The COVID-19 virus kills mostly the elderly with cardiovascular diseases, hypertension, diabetes as well as individuals with cancer (Sidaway, 2020). Notably, several proteins of this virus possess high valine plus glycine content (Wan *et al.*, 2020), which is also a feature of the causative factors of heart disease. Valine and glycine attract calcium via secondary chemical bonding with carbonyl oxygen (Wan *et al.*, 2020), giving rise to stressful calcium oxalate in susceptible individuals. Calcium oxalate crystals were visualized within 5 h after death in the thyroids in 85.2% of the disease sufferers aged 70 or older (Katoh *et al.*, 1993). Cancer cells generate excessive amount of oxalate to counteract mutagenic strong acids such as HCl (Castellaro *et al.*, 2015; Wan *et al.*, 2019), and thus confer stress to normal cells. The lungs of the deceased patients are very sticky, which could be the cause of respiratory failure (Wan *et al.*, 2020). The viscosity could be caused by the extensive secondary chemical bonding between calcium and the carbonyl oxygen atoms of glycine and valine (Wan *et al.*, 2020). A starch/vitamin diet or fasting supplemented with boiled rice water for short period of time could reduce or halt the

production of virions by limiting the intake of essential or all amino acids and decreasing the rate of viral protein synthesis (Wan *et al.*, 2020). RNA interference experiments can be conducted to lower generation of oxalate via energy metabolism prior to clinical trials.

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Conflicts of interest

There are no conflicts of interest.

References

- Castellaro AM, Tonda A, Cejas HH, Ferreyra H, Caputto BL, Pucci OA, Gil GA (2015). Oxalate induces breast cancer. *BMC Cancer* **15**:761.
- Katoh R, Suzuki K, Hemmi A, Kawaoi A (1993). Nature and significance of calcium oxalate crystals in normal human thyroid gland. A clinicopathological and immunohistochemical study. *Virchows Arch A Pathol Anat Histopathol* **422**:301–306.
- Sidaway P (2020). COVID-19 and cancer: what we know so far. *Nat Rev Clin Oncol*. doi: 10.1038/s41571-020-0366-2.
- Wan Y, Yan S, Zhang Y, An S, Yang K, Xu H, *et al.* (2020). The pneumonia outbreak: high isoleucine and high valine plus glycine contents are features of the proteins of COVID-19 virus. *Preprints* **2020**;2020020289.
- Wan Y, Zhang J, Li X, Wang Y, Liu Q (2019). Cellular states and secondary chemical bonding: a biochemical view of major human diseases. *Biochem Insights* **12**:1178626419877846.

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